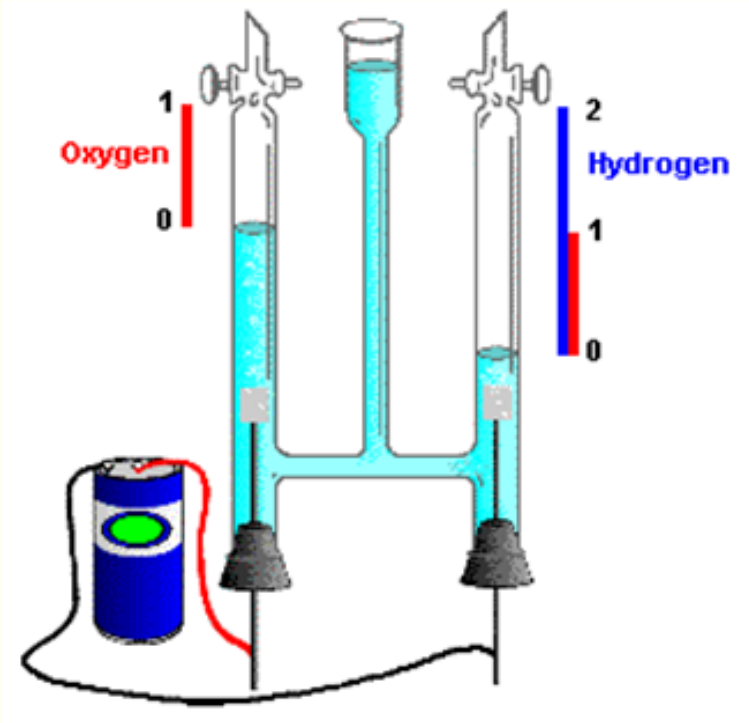
Law of Combining Volumes (Joseph Gay –Lussac)

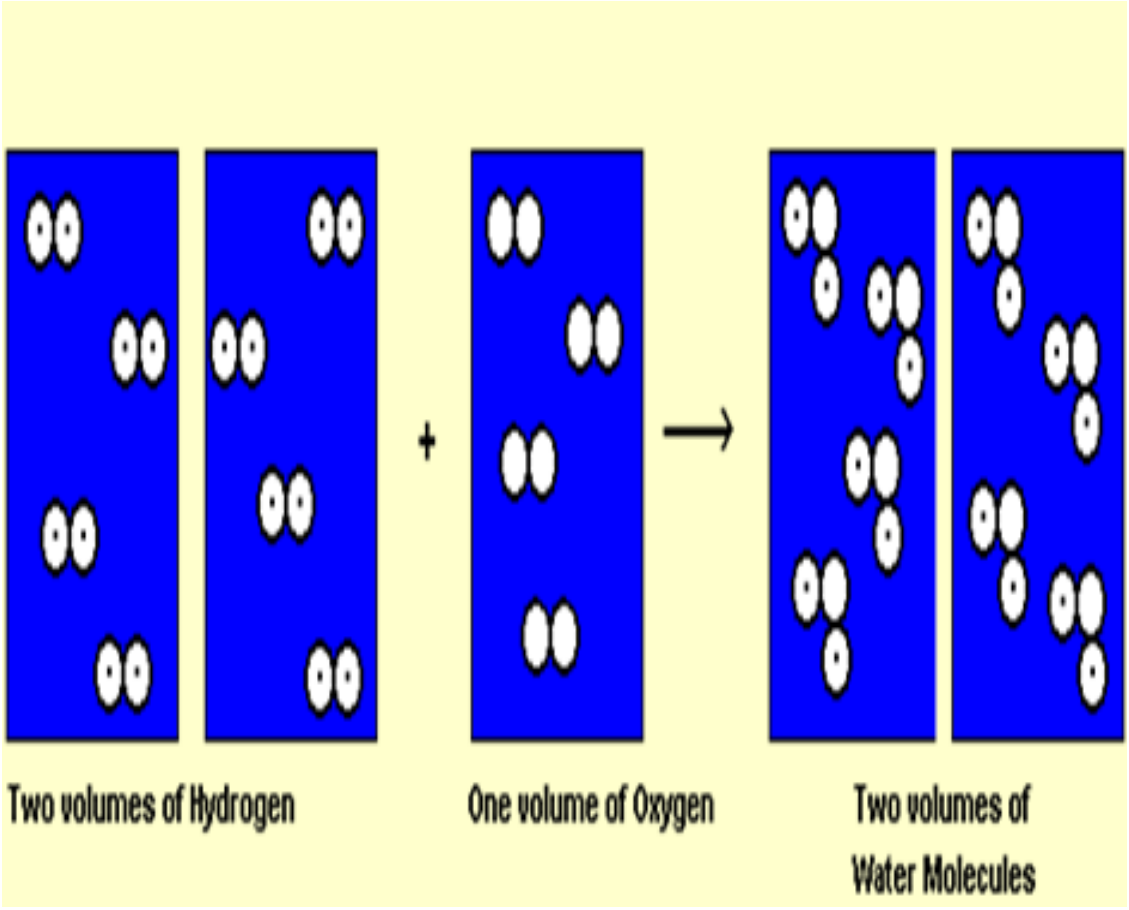
- When measured at the same temperature and pressure, volumes of gases react in simple whole number ratios.
- $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$ (This reaction always produced twice as much hydrogen as oxygen)



http://www.carlton.paschools.pa.sk.ca/chemical/molemass/avogadro.htm

Avogadro's Theory

- Equal volumes of gases at the same temperature and pressure contain equal numbers of molecules.



Fill in the table below

Vol/Vol Stoichiometry

$2\ C_8H_{18}(l) + 12.5\ O_2(g) \rightarrow 8\ CO_2(g) + 9\ H_2O(g)$

2 mol	25 mol	16 mol	18 mol
2 mol	mol	mol	mol
2 L	25 L	16 L	18 L
8 L	100 L	64 L	72 L
0.40 L	5L	3.2 L	3.6 L
250 mL	3125 mL	2000 mL	2250 mL

÷4 ×4 ×125 ÷125 1.5

Molar Volume

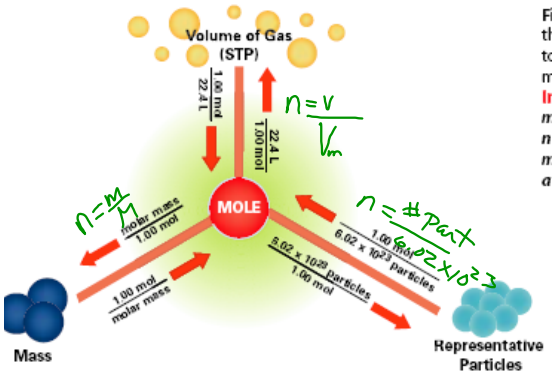
- -The volume of one mole of any gas at a specific temperature and pressure
- @STP 22.4 L/mol
- @SATP 24.8 L/mol

0°C

- Remember STP is zero celsius and 101.3kPa } Study
- And SATP(ambient) is 25 celsius and 100kPa

Calculations with molar volume

- n= v ⇐ volume and n=m
- V_m ⇐ molar volume 22.4 L/mol M
- So $\frac{v}{V} = \frac{m}{M}$



- Example ~~#3~~ 2
- What volume of balloons does 7.00 g of helium gas fill at ~~SATP~~ STP?

$\frac{v}{V} = \frac{m}{M}$

v=?

m= 7.00 g

M= 4.00 g/mol

V= ~~22.8~~ 22.4 L/mol

$\frac{v}{22.4\ L/mol} = \frac{7.00\ g}{4.00\ g/mol}$

v = 39.2 L

(~~Ans 40.1 L~~)